

CLAIMS:

What is claimed is:

- 1 1. A magnetoresistive sensor, comprising:
 - 2 a plurality of sensor stack layers; and
 - 3 at least one stabilizer depression formed in one
 - 4 sensor stack layer within the plurality of sensor stack
 - 5 layers, wherein the at least one stabilizer depression
 - 6 imparts a restorative force on a magnetic field of a free
 - 7 layer of the magnetoresistive sensor to align the
 - 8 magnetic field with a bias direction.
- 1 2. The magnetoresistive sensor of claim 1, wherein the
- 2 magnetoresistive sensor is a top spin valve sensor.
- 1 3. The magnetoresistive sensor of claim 1, wherein the
- 2 magnetoresistive sensor is a bottom spin valve sensor.
- 1 4. The magnetoresistive sensor of claim 2, wherein the
- 2 one sensor stack layer is one of an antiferromagnetic
- 3 layer and a pinned layer.
- 1 5. The magnetoresistive sensor of claim 3, wherein the
- 2 one sensor stack layer is a Gap 1 Alumina layer.
- 1 6. The magnetoresistive sensor of claim 1, wherein the
- 2 one sensor stack layer is a sensor stack layer adjacent
- 3 one of the free layer and a pinned layer.

1 7. The magnetoresistive sensor of claim 1, wherein the
2 at least one stabilizer depression is formed under a
3 permanent magnet.

1 8. The magnetoresistive sensor of claim 1, wherein the
2 magentoresistive sensor is part of a magnetic media read
3 head.

1 9. The magnetoresistive sensor of claim 1, wherein the
2 at least one stabilizer depression is formed in the one
3 sensor stack layer by milling the at least one stabilizer
4 depression in the one sensor stack layer, and wherein
5 other sensor stack layers of the plurality of sensor
6 stack layers are deposited on the milled one sensor stack
7 layer.

1 10. The magnetoresistive sensor of claim 9, wherein the
2 at least one stabilizer depressions have a depth such
3 that after deposition of the other sensor stack layers on
4 the milled one sensor stack layer, the magnetic field of
5 the free layer of the magnetoresistive sensor experiences
6 restorative forces due to the at least one stabilizer
7 depression.

1 11. A method of providing a magnetoresistive sensor,
2 comprising:
3 providing a plurality of sensor stack layers; and
4 providing at least one stabilizer depression formed
5 in one sensor stack layer of the plurality of sensor
6 stack layers, wherein the at least one stabilizer

7 depression imparts a restorative force on a magnetic
8 field of a free layer of the magnetoresistive sensor to
9 align the magnetic field with a bias direction.

1 12. The method of claim 11, wherein the magnetoresistive
2 sensor is a top spin valve sensor.

1 13. The method of claim 11, wherein the magnetoresistive
2 sensor is a bottom spin valve sensor.

1 14. The method of claim 12, wherein the one sensor stack
2 layer is one of an antiferromagnetic layer and a pinned
3 layer.

1 15. The method of claim 13, wherein the one sensor stack
2 layer is a Gap 1 Alumina layer.

1 16. The method of claim 11, wherein the one sensor stack
2 layer is a sensor stack layer adjacent one of the free
3 layer and a pinned layer.

1 17. The method of claim 11, wherein providing the at
2 least one stabilizer depression includes forming the at
3 least one stabilizer depression under a permanent magnet.

1 18. The method of claim 11, wherein the magentoresistive
2 sensor is provided in a magnetic media read head.

1 19. The method of claim 11, wherein providing the at
2 least one stabilizer depression includes forming the at

3 least one stabilizer depression in the one sensor stack
4 layer by milling the at least one stabilizer depression
5 in the one sensor stack layer, and wherein providing the
6 plurality of layers includes depositing other sensor
7 stack layers of the plurality of sensor stack layers on
8 the milled one sensor stack layer.

1 20. The method of claim 19, wherein providing the at
2 least one stabilizer depression includes milling the one
3 or more stabilizer depressions to have a depth such that
4 after deposition of the other sensor stack layers on the
5 milled one sensor stack layer, the magnetic field of the
6 free layer of the magnetoresistive sensor experiences
7 restorative forces due to the at least one stabilizer
8 depression.